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(54) Title of the Invention: **Manufacture of Senbei**

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(57) **Claims**

1. A method for manufacturing senbei, wherein senbei dough that has been formed is dried, and is baked in a baking oven, whereupon it is cooled and seasoned, said method for manufacturing senbei being characterized in that the dough that has been dried is heated prior to baking the dough, light soy sauce solution is applied to the heated dough, the light solution is then shaken off, and baking is performed in a baking oven.

Detailed Description of the Invention

The present invention relates to a method for manufacturing senbei, and in particular, relates to a method for manufacturing senbei wherein the dough is basted prior to baking the senbei dough.

Prior art

In the past, there have been various methods used in the manufacture of senbei.

In general, ordinary rice powder, glutinous rice powder, or wheat powder is placed in water, and after boiling, is kneaded, while being molded into senbei dough in a round or square shape. Then, the molded senbei dough is steam dried, and the dough is heated, and baked in a baking oven. After then allowing to cool, it is flavored with soy sauce, etc., and the flavored senbei is then steam dried a second time to obtain the final product.

Problems to be solved by the invention

However, with conventional methods, the dough does not expand uniformly, so that there are expended regions and flat regions. In addition, the baked senbei ends up being comparatively hard.

Means for solving the problems

The present invention is characterized in at the dried dough is heated prior to baking the dough, a light soy sauce solution is applied to the heated dough, and the light solution is then shaken off, whereupon the dough is baked in a baking oven.

Function

By means of the present invention, the senbei dough itself is flexible, and when baking the dough, the dough partially expands, and a product is produced that has good volume over its entire body.

Working Examples

The present invention is described below based on the working example presented in the figures.

To broadly categorize the senbei manufacture method in the working example, the method is constituted by a four stage process consisting of a dough manufacture process **1** wherein the senbei dough is produced, a basting process **2** wherein the produced dough is basted, a baking process **3** wherein the basted dough is baked, and a finishing process **4** wherein the baked senbei is seasoned (Figure 1).

The sequence starting from the dough manufacture process **1** will first be described. As shown in Figure 2, the ordinary rice used as raw material is washed with water, dried by passing through a drying conveyor, and then milled with a pressure valve device [literal translation] to produce a powder. Water and wheat starch are then added to the rice flour to produce a rice flour dough, and the rice flour dough is then steamed and kneaded. The kneaded rice flour dough is then molded into round or square senbei dough. The addition of wheat starch is performed in order to facilitate expansion during baking of the senbei dough.

In this process, about 20 wt% of wheat starch is added with respect to the ordinary rice flour, and about 40 L of water is added to 100 kg of mixture. In this case, the dough is steamed for about 10 min under elevated pressure of about 0.5-0.9 kg/cm^2. The steamed rice flour is then carried on a conveyor, where it is passed through water and cooled. The cooled rice flour dough is then kneaded well, and is molded into senbei dough that is round with a diameter of about 60 mm and a thickness of about 2-3 mm.

Next, a basting process **2** is carried out wherein the formed senbei dough is basted (Figure 3). First, the formed senbei dough is steam-dried for about 2 h, and is then allowed to stand for about 14 h to cool. The dried dough at this time has contracted about 5 mm in diameter and thickness, and weighs about 6 g.

Subsequently, the dried dough is heated for 1-3 h at about 80-90C so that sufficient heat is passed into the dough. The heated dough is then allowed to stand for about 10 min to cool, and is then transferred to a cage as-is, where light soy sauce solution is applied for 2-3 seconds.

This light soy sauce solution is produced by diluting 1 L of soy sauce with 0.5 L of warm water. The temperature of the warm water is preferably about 50-80C. The reason that the raw soy sauce is diluted with warm water rather than water is so that the dough will not cool. Once the dough cools, the baked senbei will become hard. The light soy sauce solution is warmed by the heat given off by the heated dough, and because this temperature is maintained, an additional means for maintaining temperature is not necessary. The soy sauce that is used in the light solution can be so-called strong soy sauce produced from raw materials including defatted soy beans, wheat, salt, amino acids, caramel, licorice extract and chemical flavorings.

If a light soy sauce is not used, then the solution will not be sufficiently removed after about 10 seconds of treatment with the shaking device.

Next, the basted dough **5** is passed into a baking oven **6** where a baking process **3** is carried out (Figure 4). In this baking process, nine ovens **7-9** are arranged opposite each other above and below on the interior of the baking oven **6**, and a screen **10** passes through the interior of the space with these ovens above and below, so that the dough **5** on the screen **10** is baked as the screen **10** moves along.

With the aforementioned ovens **7-9**, the first eight upper and lower ovens **7** are used for heating, and a pair of ovens **8, 8** above and below that are longer than the heating ovens **7,** and connect with the heating ovens **7**, are rising ovens used for expanding the dough. The eight ovens **9** above and below that are connected with the rising ovens **8** are browning ovens used for providing the dough with a browned appearance. Four burners are arranged respectively in each of the heating ovens **7** and browning ovens **9**. In

addition, nine burners are arranged in each of the rising ovens **8**, and so a total of 18 burners are used for the upper and lower ovens **8**, **8** combined.

The dough is thus heated by passing through the heating ovens **7**, and when the heated dough is passed through the rising ovens **8**, it expands fully as shown in Figure 5.

The expanded dough is then slightly baked when passed through the browning ovens **9**, and is received at the other end by the baking oven **6**.

Figure 7 shows a typical baking oven **6'** used for conventional senbei. This baking oven **6'** has numerous burners (12 burners) in the rising ovens **8'** relative to the baking oven **6** used in the present invention. Moreover, because the number of browning ovens **9'** is large, the dough is over-baked when baked using this baking oven **6'**, which has the disadvantage of making the senbei hard.

Thus, in the baking oven **6** pertaining to the present invention, as described above, three are fewer burners (9 burners) in the rising ovens **8** relative to the conventional baking oven **6'**, and the number of browning ovens **9** is reduced to a number equivalent to the heating ovens **7**. Moreover, the flame levels in the ovens are adjusted so that there is a medium flame in the heating ovens **7**, a strong flame in the rising ovens **8** and a low flame in the browning ovens **9**. Consequently, by adjusting the flame levels, uniform expansion can be brought about in the rising ovens **8** so that the dough is not over-baked.

A finishing process **4** is then carried out on the baked dough (Figure 6). In this process, the baked dough is transported on a conveyor and is allowed to cool, whereupon seasoning with soy sauce is carried out with an automated seasoning device, and the excess soy sauce is shaken off with a shaking device. The soy-flavored article is then subjected to steam drying to obtain the final senbei product. The reason that the dough is allowed to cool once prior to flavoring is in order to prevent excessive soy infusion during flavoring.

In performing seasoning, monosodium glutamate, mirin or other substances can be added to the soy and simmered therein. Corn starch can then be added to the simmered soy sauce to produce a stock solution, and the baked senbei can be coated therewith in order to perform seasoning. The raw materials for the soy sauce used for seasoning include defatted soy bean, wheat, salt, alcohol and chemical flavorings.

Effect of the invention

By means of the present invention as described above, the dough is coated with a light solution of soy sauce prior to baking of the senbei dough, so that the dough itself remains pliant, and moreover, the baked senbei has regions of greater expansion, with swelling occurring throughout. As a result, senbei can be offered that is light and tender when eaten.

The senbei has regions of significant expansion produced during baking, and has these areas in large numbers, so that the senbei appears to have high volume, producing favorable appearance.

Because light soy sauce solution is used for coating, senbei that has a subtle flavor can be obtained.

The effects of the invention are described below in reference to comparative examples.

Specifically, in Comparative Example 1, the process where light soy sauce solution is applied to the dough was omitted, and the senbei dough was baked as-is in the baking oven.

In Comparative Example 2, a dough produced by applying salt water rather than light soy sauce solution was baked in the baking oven. The salt water used herein was a solution produced by adding 6 L of water to 1 kg of salt.

Other conditions were the same as in the working example of the present invention described previously. The senbei was removed from the baking oven and compared without seasoning.

The results of comparison for Comparative Example 1 are shown in Figure 8.

With the senbei of Comparative Example 1, the senbei expanded to produce a circular shape with a diameter of 65-70 mm, and the thickness was about 30-50 mm in the regions that were relatively flat. In the regions that were relatively highly expanded, the thickness was about 70-100 mm, and the number of these individually isolated regions was about 5-10, meaning that the material expanded while staying relatively flat. In addition, the surface was relatively rough, and numerous cracks were present. The senbei was difficult to break, and the surface grains were fine. There was no flavor.

In Comparative Example 2, baking produced the senbei shown in Figure 9.

The senbei of Comparative Example 2 expanded into a circular shape with a diameter of 80-90 mm, and the thickness in the relatively flat regions was about 30-50 mm. In the relatively highly expanded regions, the thickness was about 70-150 mm, but the borders between these localized regions were not distinct, and the senbei expanded in a relatively flat condition. In addition, the surface was smooth, without cracks. The material was comparatively easy to break relative to Comparative Example 1. The grains at the broken surface were comparatively large, but there was no flavor.

In contrast, the senbei dough baked by means of the manufacture method of the present invention, as shown in Figure 5, expanded to produce a circular shape with a diameter of 85-95 mm, and the thickness at the relatively flat regions was about 50-70 mm. The regions that were relatively highly expanded had thicknesses of 100-200 mm, and there were a large number of these expanded regions that formed distinct bumps. The boundaries of these local regions were clear, and the senbei had the appearance of high volume. The surface was smooth and had no cracks. The senbei was also easily broken and the grains at the broken surface were large. The senbei also had a baked rice cake flavor.

Brief description of the figures

The working example of the present invention is presented in the figures. Figure 1 is an explanatory diagram of the process for manufacturing senbei. Figure 2 is an explanatory diagram of the dough manufacture process. Figure 3 is an explanatory diagram of the coating process. Figure 4 is a schematic diagram of the baking oven. Figure 5 is a perspective diagram of the senbei dough that has been baked. Figure 6 is an explanatory diagram of the final process. Figure 7 is a schematic diagram of a conventional baking oven. Figure 8 and Figure 9 are perspective diagrams of senbei dough that was baked in the comparative examples.

In the figures, 1 denotes the dough manufacture process, 2 denotes the coating process, 3 denotes the baking process, 4 denotes the finishing process, 5 denotes the dough, 6 denotes the baking oven, 7 denotes heating ovens, 8 denotes rising ovens, 9 denotes browning ovens and 10 denotes a screen.

Figure 1

1 Dough manufacture process

2 Coating process

3 Baking process

4 Finishing process

Figure 3

1 Senbei dough

2 Drying

3 Cooling

4 Heating

5 Coating

6 Shaking

Figure 2

1 Raw material (ordinary rice)

2 Rinsing

3 Drying

4 Milling

5[in oval box] Raw material Wheat starch

Warm water

6 Steaming

7 Cooling

8 Kneading

9 [in lower box] Forming

Figure 4

Figure 5

Figure 8

Figure 9

Figure 6

1 Processed dough

2 Cooling

3 Flavoring

4 Drying

Figure 7

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審査請求　有　発明の数 1　（全4頁）

⑭発明の名称　煎餅の製造方法

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明　細　書

1．発明の名称

煎餅の製造方法

2．特許請求の範囲

型取りした煎餅生地を乾燥させた後、焼鉄で焼き、その後冷却させて味付けを行う煎餅の製造方法において、

生地を焼く前に、乾燥させた生地を加熱し、加熱生地を型枠の得め底に付け、その得め底を取り切った後、焼鉄で焼く様にしたことを特徴とする煎餅の製造方法。

3．発明の詳細な説明

（産業上の利用分野）

この発明は、煎餅の製造方法に関し、特に煎餅生地を焼く前に、生地に下付けを施す様にしたものである。

（従来の技術）

従来、煎餅の製造法としては種々の方法がある。

一般的には、粳米粉や糯米粉、小麦粉を水で溶かし、蒸した後練って、それをのしながら丸型や方型の煎餅生地に成形する。そして、成形した煎餅生地を蒸気乾燥し、その生地を加熱してから焼鉄で焼き、自然冷却した後、醤油等で味付けを行い、味付けした煎餅を再度蒸気乾燥して最終製品とする。

（発明が解決しようとする問題点）

しかし、従来の製法では、煎餅生地を焼いた際に、生地がふっくらと膨らまず、又、膨らんだ部分も扁平で、煎餅が比較的堅焼に仕上ってしまう。

（問題点を解決するための手段）

そこで本発明は、生地を焼く前に、乾燥させた生地を加熱し、加熱生地を型枠の得め底に付け、その得め底を取り切った後、焼鉄で焼く様にしたことを特徴とするものである。

（作　用）

従って本発明によれば、煎餅生地自体が柔らかくなり、生地を焼いた際に部分的に膨張して全体

的にふっくらと仕上る。

（実施例）

以下本発明を図面に示した一実施例に基づいて説明する。

実施例による煎餅の製造法を大別すると、煎餅生地を作る生地製造工程1と、出来た生地に下付けを行う下付け工程2と、下付けした生地を焼く焼成工程3と、焼き上った煎餅に味付けを行う仕上げ工程4との4段階の工程より構成される（第1図）。

先ず、生地製造工程1から順を追って説明すると、第2図に示す様に、原料としての粳米を水洗いした後、乾燥コンベアを通して乾燥し、乾燥した粳米を正べん機で砕いて粉とする。この粳米粉に小麦でんぷんと水を加えて捏ねとし、この捏ねを寝かしてから練り、練った捏ねをのして丸型や方型の煎餅生地に成形する。尚、小麦でんぷんを加えるのは、煎餅生地を焼いた際に膨らみ易くするためである。

こゝでは、粳米粉に対して小麦でんぷんを約20wt%加え、この混合物 100Kgに対して温水を約40ℓの割合で加えてとき、圧力約 0.5Kg/cm²～0.9Kg/cm²を加えながら約10分間蒸す。蒸した捏ねはコンベアに載せて水中を通して冷やし、冷えた捏ねを充分に寝かしてからのして、厚みが約2～3mm程度で、直径が約80mm程度の丸型な煎餅生地に成形する。

次に、型取りした煎餅生地に下付け工程2を行う（第3図）。先ず、型取りした煎餅生地を約2時間程、蒸気乾燥した後、そのまゝ約140時間自然放置して乾燥する。このときの乾燥した生地は、厚み並びに直径が約5mm程度収縮して、約6g程度の重量となる。

その後、乾燥した生地を約80～90℃で1～3時間程加熱して、生地に充分な油を通す。加熱した生地は約10分程自然放置してねましてから、そのまゝ缶に入れて、醤油の煮め液に2～3秒間付ける。

この醤油の煮め液は、生醤油1ℓに対して温水を 0.5ℓの割合で加えて煮めたものであり、温水の温度は約50～60℃程度が適当である。尚、生醤油を水で煮めずに、温水で煮めることゝしたのは、生地を冷やさない様にするためであり、生地を一旦冷やしてしまうと、焼き上った煎餅が堅くなってしまうからである。但し、醤油の煮め液は、加熱した生地の余熱で暖められ、その温度が保たれるので、特別な保温手段は必要としない。尚、煮め液に使用する醤油は、淡口こいくちのものを使用し、脱脂加工大豆、小麦、食塩、アミノ酸液、カルメラ、甘草エキス、化学調味料等を原料とする。

そして、煮め液に付けたならば、振り切り機に約10秒程かけて、その煮め液を適度に振り切る。

次いで、下付けをした生地5を焼盆6に通して焼成工程3を行う（第4図）。こゝでは、焼盆6内に9個の盆7～9を上下に相対向して配置し、その上下の対向間隙内に網10を通し、この網10の上に生地5を並べて網10をスライドしながら焼く。

上記盆7～9は、その手前の上下8個の盆7…が加熱用のもので、この加熱用盆7に連続する加熱盆7より長い上下一対の盆8，8が生地に膨らみ出すための焙かし用のもので、この焙かし用盆8に連続する上下8個の盆9…が生地に焦げ目を付ける色付け用のものである。そして、加熱用盆7及び色付け用盆9には、その一個の盆内に4本のバーナが夫々配列されている。又、焙かし用盆8にはその一個の盆内に9本のバーナが配列され、上下の盆8，8を合せて計18本のバーナを使用する。

従って、生地は、加熱用盆7を通ることにより加熱され、加熱された生地は、焙かし用盆8を通る際に、第5図に示す様に充分に膨れる。

そして、膨れた生地は、色付け用の盆9を通る際に少し焦げ、盆盤6の施錠より回収される。

尚、第7図は従来の煎餅用の一般的な焼盆6'を示すもので、この焼盆6'は本発明による焼盆6に比べ、焙かし用盆8'内のバーナの数が多く（12本バーナ使用）、しかも、色付け用盆9'の盆数が多いため、この焼盆6'を使用して生地を

焼くと、生地に焼が入り過ぎてしまい、煎餅が硬くなる欠点が有った。

そこで、本発明による焼釜6では、先に説明した様に、炎天の焼釜6'に対して浮かし用釜6内のバーナの数を少なくし（3本バーナ使用）、更に色付け用釜9の番数を加熱用釜7と等しい数に減らし、しかも、火の加減を加熱用釜7は中火、浮かし用釜8では弱火、色付け釜9では強火とし、火加減にも変化を付けて、生地に焼が入り過ぎない様にして、浮かし用釜8で一気に膨らませる様にする。

最後に、焼き上った生地に仕上げ工程4を行う（第6図）。こゝでは、焼き上った生地をコンベアに受けて自然冷却した後、自動味付け機で醤油の味付けを行い、余分な醤油を振り切り機で振り切る。そして、醤油の味付けをしたものを、蒸気乾燥して最終製品である煎餅とする。尚、味付け付け前に一旦冷却するのは、味付けの際に醤油のしみ込み過ぎを防止するためである。

又、味付けに際しては、醤油にグルタミン酸ソーダ及びみりん等を加えて煮、煮上った醤油に黒砂糖でんぷんを加えた液液に、焼き上った煎餅を付けて、味付けを行う。尚、味付け用の醤油の原料は、脱脂加工大豆、小麦、食塩、アルコール、化学調味料等である。

（発明の効果）

以上説明した様に本発明によれば、煎餅生地を焼く前に、生地に醤油の薄め液で下付けを施しているため、生地自体が柔らかくなるばかりでなく、焼き上った煎餅が部分的に大きく膨張して、全体的にもふっくらと膨らみ、食したときにも軽く且つ歯ざわりの煎餅を提供できる。

又、焼いた際にできる膨らみ部分が大きく、しかもその数も多く、ボリューム感があって見栄えがよい。

更に、下付けに醤油の薄め液を使用しているので、下味が効いた風味の有る煎餅を提供できる。

一方、本発明の効果を比較例と対比して説明すると、次の様な結果が得られた。

即ち、比較例1では、醤油の薄め液による下付け工程を省略し、煎餅生地をそのまゝ焼釜で焼いた。

又、比較例2としては、醤油の薄め液の換わりに、塩水で下付けをしたものを、焼釜で焼いた。このとき塩水は、塩を1Kgに対して水を6ℓ加えて溶かした溶液を使用する。

尚、他の条件は、先に説明した本発明の実施例のものと同一条件とし、味付けをすることなく、焼釜から取り出されたまゝのものを対比した。

比較結果を示すと、比較例1によるものは、第8図に示す様に焼き上った。

比較例1のものは、その直径が65～70mmでほゞ円形に膨らみ、比較的に扁平な部分でその厚みが30～50mm程度である。そして、比較的大きく膨れた部分では、その厚みが70～ 100mm程で、その数が5～10個程度で互に離れて点在し、比較的扁平に膨らんでいる。又、その表面は、比較的ざら付き、複数の亀裂が生じている。更に、割った際にも軽く、その断面の粒子が粗剛であり、風味がない。

又、比較例2によるものは、第9図に示す様に焼き上った。

比較例2のものは、その直径が80～90mmで楕円形に膨らみ、比較的に扁平な部分でその厚みが30～50mm程度である。そして、比較的大きく膨れた部分では、その厚みが70～ 150mm程であるが、夫々の膨部分の境目がはっきりせず、比較的扁平に膨らんでいる。又、その表面は、滑らかで、亀裂が見られない。更に、比較例1よりは比較的軽く割れ、その断面の粒子も比較的大きいが、風味がない。

これに対して本発明の製造方法により焼上った煎餅生地は、第5図に示す様に、その直径が85～95mmで楕円形に膨らみ、比較的に扁平な部分でその厚みが50～ 70mm 程度である。そして、比較的大きく膨れた部分では、その厚みが 100～200mmで、その数も多く、一つ一つがこぶ状に膨らみ、夫々の膨部分の境目がはっきし、しかもボリューム感に富む。又、その表面は、滑らかで、亀裂が見られない。更に、極めて軽く割れ、その

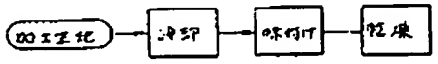
断面の粒子が大きく、しかも揃った美な香りがする。

4. 図面の簡単な説明

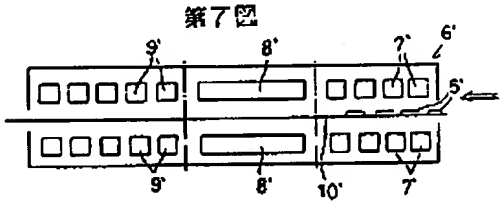
図面は本発明の一実施例を示すもので、第1図は煎餅の製造工程の説明図、第2図は生地製造工程の説明図、第3図は下付け工程の説明図、第4図は焼型の概略図、第5図は焼き上った煎餅生地の斜視図、第6図は焼成工程の説明図、第7図は従来の焼型の概略図、第8図及び第9図は比較例により焼き上った煎餅生地の斜視図である。

図中、1は生地製造工程、2は下付け工程、3は焼成工程、4は仕上げ工程、5は生地、6は焼型、7は加熱用型、8は浮かし用型、9は色付け用型、10は割を夫々示す。

第6図



第7図

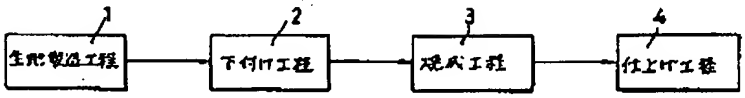


第5図

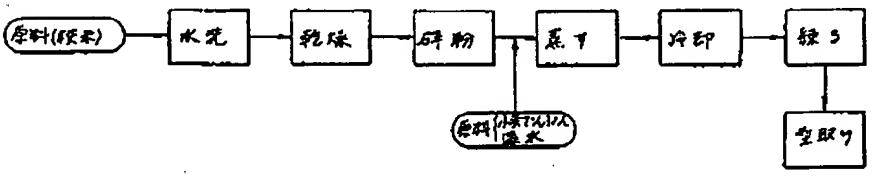
第8図

第9図

第1図



第2図



第3図

第4図